8587.0011

July 25, 1996

07559.024

Commanding Officer
Southern Division
Naval Facilities Engineering Command
Attn: Mr. Dana Gaskins, Code 1857
2155 Eagle Drive
Charleston SC 29418

SUBJECT: Naval Air Station Jacksonville, Building 780.

Dear Mr. Gaskins:

This letter report provides responses to your memo dated 6/26/96 concerning air pollution control for the thermal oxidation unit at Building 780.

1. **If we do this (operate the thermal oxidation unit without any air emissions control) will we violate the air emission standards? The station is unwilling to allow an operation which is going to violate air emission standards?**

   Thermal oxidation of chlorinated compounds results in the generation of hydrochloric acid gas. Hydrochloric acid is a regulated air contaminant in Florida. Based on estimated chlorinated compound extraction rates documented in the design, hydrochloric acid generation is expected to exceed the regulatory limit.

2. **Can we place some type of controls on the system to insure we do not violate the air emissions standards? If so they should be cost efficient.**

   Yes. The remedial technology selected must be able to treat acid gases generated from combustion equipment (i.e., thermal oxidizers, boilers, power plants, waste-to-energy plants). Since the contaminant of concern is hydrochloric acid (HCL) gas, the unit will have to meet regulatory standards established for HCL gas. The Florida Department of Environmental Protection (FDEP) has established a daily ambient reference concentration of 17 micrograms per cubic meter, as a guidance value to regulate this pollutant. Although this is a guidance value, conversations with John Glunn, FDEP's air toxics workgroup chairperson (Tallahassee), indicate it could be used as an enforceable standard.

   Three technologies were evaluated for treating HCL gas from the operation of the thermal oxidation unit; Wet scrubbing, dry scrubbing and vapor phase carbon. The following paragraphs provide a description of each technology.

Wet Scrubbers

Wet scrubbers use an alkaline solution to wash the exhaust combustion gases of acid gas pollutants and to a lesser extent particulate matter. Wet scrubbers can be either a spray-type, using droplets as the collecting media, or a type which uses a wetted surface to collect particulates by impaction. Spray-type scrubbers emit a series of droplets usually in the range of 100 to 1000 microns in diameter. These droplets, after absorption of the acidic gas components, become attached to collecting surfaces, removing the acid gases from the discharge stream by aerodynamic capture.

Dry Scrubbers

Dry scrubbers, also referred to as wet-dry, semi-dry, or spray-dry scrubbers, operate by introducing the combustion gases into an reacting chamber where the gases are contacted by a finely atomized lime slurry. Acid gases react with the alkaline component of the dispersed lime slurry to form salts. Evaporation of the water produces a particulate mixture of residual salts and unreacted alkaline materials. Additionally, through evaporative cooling, gases are discharged from the reaction chamber at a lower temperature than that found at their introduction. A portion of the dry powder (i.e., particulate mixture) is deposited on the bottom of the vessel while the flue gases, containing the remaining powder with reacted acid gas salts, are routed to a particulate control device (e.g., baghouse filter).

Vapor Phase Carbon

Vapor phase activated carbon uses a potassium hydroxide impregnated carbonaceous media that when exposed to acid contaminated gases, adsorbs materials onto the matrix. Carbon units are typically connected in series, utilizing a blower to draw in gases through the reaction vessels.

Conclusions

After reviewing the technical practicability and cost-effectiveness of the technologies, ABB-ES recommends use of a wet scrubber to treat off-gas from the thermal oxidation unit to be installed as part of the process treatment at Building 780. Table 1 summarizes the criteria used to screen the alternatives and select the most applicable to the project.

Wet scrubbers are widely used for this application, have lower costs than other technologies and are available from numerous vendors. Cost estimates (see attachment) indicate an average capital cost for the unit of between $20,000 and $30,000, with the provision that the stack be able to withstand hurricane force winds. Additionally, these units can be operated with recirculation of process water minimizing offsite water discharge. Typically, a wet scrubber may recirculate greater than 95% of the process water.

The enclosed attachment also contains preliminary cost quotes for a vapor phase carbon unit and a thermal oxidation with wet scrubbing unit to be used for comparison.

3. **Are there other things which can be done to achieve our goals in a more cost effective method?**

Based on the technologies reviewed in response 2, ABB believes a wet scrubber will provide the most cost effective treatment of potentially acidic offgas.

Table 1
Comparative Analysis of Acid Gas Treatment

Response to Comments, Building 780
NAS Jacksonville, Jacksonville, Florida

Alternative:	Dry Scrubber	Wet Scrubber	Vapor Phase Carbon
Technology			
Hydrochloric acid gas removed?	Yes	Yes	Possibly
Technically practicable to be used at the site?	No	Yes	No
Cost effective relative to other technologies?	No	Yes	No
Uncertainty of attaining action levels.	Low	Low	High
Process water or residuals handling and disposal required?	Yes	Yes	Yes[2]
Cost			
Present Worth	$300,000[1]	$30,000	N/A[3]

Notes: NA = not available
NAS = Naval Air Station.
[1] Verbal estimate provided by Bechtel.
[2] Canister recycling and regeneration required.
[3] Cost on a per canister basis, since total number of canisters needed is unknown cost cannot be calculated.

4. **What is being done at other sites where this type actions are being operated?**

Generally, when chlorinated organics are destroyed in a thermal oxidation unit, a scrubber of some kind is required. Wet scrubbers, while not the only technology available, are used quite frequently for this operation.

5. **Are the cost quotes we are getting reasonable?**

Information concerning quotes provided to the Navy by Bechtel has not been received or reviewed by ABB-ES. However, as ABB-ES was unable to locate a dry scrubber system supplier for the relatively small throughput required, we have assumed the $300,000 verbal estimate provided by Bechtel may be based on a custom sized unit.

If you have any questions, please call me at 904-656-1293.

Sincerely

ABB ENVIRONMENTAL SERVICES INC.

Phylissa Miller
Principal Task Order Manager

Timothy M. Kelly, EIT
Civil/Environmental Engineer

Attachment A: VENDOR INFORMATION AND COST DATA

cc: Mr. Frank Cater, BEI
Ms. Diane Lancaster FED, NAS JAX
Mr. Larry Blackburn, ROICC, NAS JAX
Mr. Don Haumann, ABB-ES

RES.COM.BLD780
PHM.07.96